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Association for Academic Surgery

A significant proportion of small bowel obstructions require >48 hours to resolve after gastrografin



Michelle B. Mulder, MD,^{a,*} Matthew Hernandez, MD,^b
 Mohamed D. Ray-Zack, MBBS,^b Daniel C. Cullinane, MD,^c
 David Turay, MD,^d Salina Wydo, MD,^e Martin Zielinski, MD,^b
 and D. Dante Yeh, MD^a

^a Division of Surgery, Trauma and Surgical Critical Care, Dewitt-Daughtry Family Department of Surgery, University of Miami Miller School of Medicine and Ryder Trauma Center, Miami, Florida

^b Division of Trauma, Critical Care, and General Surgery, Mayo Clinic, Rochester, Minnesota

^c Department of Surgery Marshfield Clinic, University of Wisconsin, Marshfield, Wisconsin

^d Department of Surgery, Loma Linda University School of Medicine, Loma Linda, California

^e Division of Trauma, Surgical Critical Care, and Acute Care Surgery, Cooper University Hospital, Camden, New Jersey

ARTICLE INFO

Article history:

Received 2 March 2018

Received in revised form

9 July 2018

Accepted 3 August 2018

Available online xxx

Keywords:

Small bowel obstruction

Nonoperative management

Gastrografin

ABSTRACT

Background: Gastrografin (GG)-based nonoperative approach is both diagnostic and therapeutic for partial small bowel obstruction (SBO). Absence of X-ray evidence of GG in the colon after 8 h is predictive of the need for operation, and a recent trial used 48 h to prompt operation. We hypothesize that a significant number of patients receiving the GG challenge require >48 h before an effect is seen.

Methods: A post hoc analysis of an Eastern Association for the Surgery of Trauma multi-institutional SBO database was performed including only those receiving GG challenge. Successful nonoperative management (NOM) was defined as passage of flatus or nasogastric tube (NGT) removal. NOM was considered a failure if operative intervention was required. Multiple logistic regression was performed to identify predictors of delayed (>48 h) GG challenge effect and expressed as odds ratios with 95% confidence intervals.

Results: Of 286 patients receiving GG, 208 patients (73%) were successfully managed nonoperatively. A total of 60 (29%) NOM patients had NGT decompression for >48 h ($n = 54$) or required >48 h to pass flatus ($n = 34$), with some requiring both ($n = 28$). Prior abdominal operations and SBO admission were protective of delayed GG effect (0.411 [0.169–1.00], $P < 0.05$; 0.478 [0.240–0.952], $P < 0.036$).

Presented at 2018 Academic Surgical Congress, Jacksonville, FL, January 30–February 1, 2018. 2018 Florida Chapter American College of Surgeons Annual Meeting, Orlando, FL, April 6–7, 2018.

* Corresponding author. Ryder Trauma Center, 1800 NW 10th Avenue, Ste T215 (D-40), Miami, FL 33136. Tel.: +1 616 443 4511; fax: +1 305 585 7065.

E-mail address: michelle.mulder@jhs-miami.org (M.B. Mulder).

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<https://doi.org/10.1016/j.jss.2018.08.019>

Conclusions: A significant proportion of patients at 48 h (29%) “failed” the GG challenge as they had yet to pass flatus or still required NGT but were nonetheless successfully managed non-operatively. Extending the GG challenge beyond 48 h may help avoid unnecessary operations. Level of evidence: Level II.

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Introduction

Small bowel obstruction (SBO) is a challenging disease entity as management varies and a consensus guideline for proper management does not exist. However, enteric administration of hyperosmotic contrast such as Gastrografin (GG; Bracco Diagnostics, Inc, Monroe Township, NJ) has been found to be both diagnostic and therapeutic in the nonoperative management (NOM) of SBO.¹⁻³ In the largest study to date of the use of GG in SBO, Zielinski *et al.*⁴ demonstrated that in patients with adhesive SBO, receipt of GG resulted in lower rates of operative exploration and shorter hospital length of stay (LOS) compared with patients not managed with GG. Similar results were reported in a systematic review by Branco *et al.*⁵ However, a recent randomized trial by Scotté *et al.* concluded that GG had no added benefit in SBO management as clinical outcomes of those who received GG were not significantly different from those who did not receive GG.⁶ In that trial, they allowed up to 48 h for GG to take effect, after which persistent obstructions were defined as NOM failure and then proceeded to operative intervention (odds ratio). We have anecdotally observed that some SBO cases require more than 48 h to successfully resolve with NOM. Thus, we performed a *post hoc* analysis of an Eastern Association for the Surgery of Trauma (EAST) multi-institutional data set to investigate the phenomenon of delayed GG effect (>48-h resolution). We hypothesized that a significant proportion of patients receiving GG required more than 48 h before an effect was seen.

Methods

A *post hoc* analysis of the EAST-sponsored multicenter study of adhesive small bowel obstructions (EAST-SBO) was performed. Institutional Review Board approval for retrospective review of the EAST database was obtained, and the requirement for informed consent was waived. Patients were excluded if GG was

not administered, clinical indications for operative intervention (such as closed loop obstruction, peritonitis, or a diagnosis of sepsis) were present, and if a nasogastric tube (NGT) was not inserted. Cases with NGT removal on the same day as insertion or with flatus before NGT insertion were also excluded. Total number of NGT days (date of removal [or operation] minus date of insertion) and days from NGT insertion to the appearance of first flatus were calculated. Patients were then categorized into those who ultimately underwent operative intervention (failed the GG challenge) and those treated successfully with NOM (passed the GG challenge). Importantly, the conventional markers of bowel movements or radiographic presence of contrast in the colon following a GG challenge, while analyzed, were not used to define GG's success. Instead, NOM was considered a failure if the patient ultimately underwent an operation for bowel obstruction. In the NOM group, passage of flatus and NGT removal served as surrogate markers for passing the GG challenge. In the operative group, complications were compared between patients requiring preoperative NG decompression for more than (*versus* less than) 96 h.

Descriptive statistics were calculated using SPSS, version 22.0 (International Business Machines, Chicago, IL). Parametric data were reported as mean \pm standard deviation and compared with two-sided Student's *t*-test. Nonparametric data were reported as median (interquartile range 25%-75%) and compared with Mann-Whitney *U* test. Multiple logistic regression analysis was performed to predict the odds of delayed (>48 h) GG effect, controlling for previous abdominal operations and previous bowel obstruction admission. Statistical significance was defined for all *P* values less than or equal to 0.05.

Results

A total of 286 patients were included; patient characteristics and clinical outcomes are displayed in Table 1. NOM was successful in 208 patients (73%). There were no significant differences in

Table 1 – Patient characteristics and clinical outcomes.

Demographics and outcomes	All (n = 286)	OR (n = 78)	NOM (n = 208)	P-value
Age (y)	64 \pm 17	65 \pm 15	64 \pm 16	0.84
Female sex (%)	158 (55)	46 (59)	112 (54)	0.51
Prior SBO admission (%)	112 (39)	30 (38)	82 (39)	0.79
Prior abdominal OR (%)	252 (88)	70 (90)	182 (88)	0.69
Number of prior abdominal OR (%)	2.7 \pm 1.7	2.7 \pm 1.6	2.7 \pm 1.7	0.73
Time to X-ray (h)	8 (5-9)	8 (6-9)	8 (4-9)	0.02
GG in colon (%)	186 (65)	15 (19)	171 (82)	<0.001
Hospital LOS (d)	4 (3-9)	10 (7-16)	3 (2-5)	<0.001

LOS = length of stay; NOM = nonoperative management; OR = operative exploration; SBO = small bowel obstruction.

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